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THE ILLINOIS TEST OF PSYCHOLINGUISTIC ABILITIES IN CURRENT RESEARCH. SUMMARIES OF STUDIES.

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RESEARCH GENERATED BY THE EXPERIMENTAL EDITION OF THE ILLINOIS TEST OF PSYCHOLINGUISTIC ABILITIES IS REVIEWED. TWENTY-FIVE STATISTICAL, REMEDIAL, AND LANGUAGE DISORDER STUDIES ARE SUMMARIZED ACCORDING TO PURPOSE, SUBJECTS, PROCEDURE, RESULTS, AND COMMENTS. SEVEN ADDITIONAL STUDIES ARE INCLUDED IN AN ANNOTATED BIBLIOGRAPHY. FIFTY-FOUR OTHER REFERENCES ARE ALSO INCLUDED. (MK)

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Summaries of Studies

Barbara Bateman

INSTITUTE FOR RESEARCH ON EXCEPTIONAL CHILDREN
UNIVERSITY OF ILLINOIS

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Foreword

The publication of the experimental edition of the Illinois Test of Psycholinguistic Abilities in 1961 stimulated a considerable body of research on children with learning disabilities in this country and abroad. At the Institute for Research on Exceptional Children numerous requests have been received for information about the development of the test and the research it has generated.

To meet this need, Dr. Barbara Bateman has compiled in this manuscript research which has been completed and is available in some form, either in articles, monographs, mimeographed publications or unpublished theses and dissertations. Studies now underway have not been reviewed here.

It is our hope that those using the ITPA in research will keep us informed of their findings so that with future additions we can keep this compilation complete and current.

Much of the work reported herein and conducted at the Institute for Research on Exceptional Children has been aided by grants from the United Cerebral Palsy Research and Educational Foundation and the Grotto Humanitarian Foundation.

S. A. Kirk, *Director*

Institute for Research on
Exceptional Children

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Statistical Studies

SEMMEL, M. I., and MUELLER, M. W. A factor analysis of the Illinois Test of Psycholinguistic Abilities with mentally retarded children. Unpublished study, George Peabody College, 1962.

Purpose

The purpose of this investigation was to explore the factor validity and structure of the ITPA as applied to mentally retarded children. Since the test was constructed after the Osgood model of psycholinguistic abilities, it was expected that factor analysis would uncover factors approximating those of the model. A second purpose was to seek a more parsimonious method of assessing language skills in mentally retarded children through an abbreviated version of the ITPA.

Subjects

The subjects were 118 mentally retarded children, from day and residential schools in Tennessee, whose IQs ranged from 20 to 80 with a mean of 49; CAs ranged from 6-5 to 19-0 with a mean of 12-7; and MAs ranged from 3-6 to 9-1 with a mean of 5-10. There was an equal number of girls and boys. The etiology of retardation was undetermined except for 18 cases of Down's Syndrome.

Procedure

Intercorrelations of ITPA subtest scores, total language age, CA, MA, and IQ were computed and a centroid factor analysis completed. The raw factor solution was rotated by the Quartimax method which yields orthogonal factors that increase the inequalities among the factor loadings. It was reasoned that if the ITPA subtests were independent, support for this could be obtained by maximizing the proportion of small and large loadings while neglecting medium size loadings.

Results

Total language age correlated positively (range of correlations was .52 to .81) with all subtests. Mental age was also significantly correlated with all subtests (range was .33 to .62). Quartimax orthogonal rotation revealed a simple structure in which each of the nine factors appeared to be defined by a single variable. The Auditory-Vocal Association subtest contributed both a common variance (to all other factors) and a specific variance.

Comments

The authors interpreted this study as supporting both the theoretical structure and the factor validity of the ITPA. The independent nine factors, which were empirically demonstrated in this study, corresponded to Kirk and McCarthy's definitions of the nine subtests. A limitation in the applicability of this study is that all subjects were mentally retarded.

CENTER, W. R. A factor analysis of three language and communication batteries. Unpublished doctoral dissertation, Univer. of Georgia, 1963.

Purpose

The purposes of this study were (1) to determine the number of factors represented by the nine ITPA tasks in the context of three test batteries (ITPA, Achievement, and Partial Primary Mental Abilities Tests) and (2) to explore the possibility of extending the ITPA to higher age levels by means of selected group intelligence and achievement tests which are cognitively similar to the ITPA subtests.

Subjects

The three batteries of tests were administered to a culturally homogeneous third grade group of 23 boys and 25 girls between the ages of 8 and 9 years in a Georgia county school system. IQs derived from the Primary Mental Abilities Test ranged from 90 to 121 with a mean of 104.9 and a standard deviation of 7.6.

Procedure

The ITPA, an Achievement Battery made up of selected subtests, and the Partial PMA Battery were administered to all 48 subjects. A factor analysis of the 22 task variables was carried out using the Varimax criterion for the orthogonal rotation.

Results

The 22 task variables yielded eight factors. The ITPA was well represented on seven of the eight factors, but two subtests split their variance. No ITPA subtest loaded on visual perception for symbol sequences (Factor I). Both Vocal and Motor Encoding loaded on Extraversion (Factor II). Visual Decoding loaded moderately on Reasoning (Factor III), but its highest loading was on Visual, Non Verbal Perception (Factor V). It was assumed that Reasoning (Factor III) was not assessed by the ITPA more than moderately and that only by Visual Decoding. Auditory Decoding received a high loading on Verbal or Auditory Comprehension (Factor IV). Both Visual-Motor Association and Visual Decoding loaded significantly on Visual, Non Verbal Percep-

tion (Factor V). Three ITPA subtests — Auditory-Vocal Sequencing, Auditory-Vocal Automatic and Auditory-Vocal Association — loaded significantly on Inner Language (Factor VI). Auditory Decoding loaded moderately on Perception (Factor VII) but loaded much higher on Verbal or Auditory Comprehension (Factor IV). Visual-Motor Sequencing loaded very significantly on Memory (Factor III). The subtests that had the highest loading (each on different factors) were Motor Encoding, Auditory Decoding, Visual-Motor Association, Auditory-Vocal Association, and Visual-Motor Sequencing. At the age and intelligence level of the children in this study, these five subtests appeared to cover the same range of behavior that nine subtests were designed to cover.

No upward extension of the ITPA can actually be made on the basis of this study, but it may be inferred from the relationships between the ITPA subtests and other tests in the battery that the following tests could serve as a starting point from which to actually extend the test: (1) Davis Eells, Best Ways (motor encoding, vocal encoding, visual-motor sequencing); (2) Metropolitan Achievement, Language Usage (auditory-vocal sequencing, auditory-vocal automatic); (3) Davis Eells, Analogies (auditory-vocal association); (4) Visual Digit Span (visual-motor association); (5) PMA, Figure Grouping (visual decoding); and (6) PMA, Verbal, Pictures (auditory decoding).

Comments

The nine tasks of the ITPA, when used with normal to bright children eight years of age and in a context of tasks such as were used in this study, appear to represent five factors. The ITPA was not designed, however, for use with average children this age since they were all performing at or above the ceiling of the test. This study does not necessarily mean that the ITPA, when used with handicapped children and normal children younger than eight years, may not assess nine different "single-abilities" as McCarthy and Kirk posited. The split-half reliabilities of some of the 22 tasks used in this study were rather low. For example, the Visual-Motor Association reliability coefficient was .16 and Visual Decoding was .24.

LOEFFLER, F. J. An extension and partial replication of Meyers, *et al.*'s primary abilities at mental age six. Paper presented at the biennial meeting of the Society for Research in Child Development, Berkeley, California, April, 1963.

Purpose

The purposes of this study were (1) to repeat a portion of Meyers' Pacific State Hospital "factor-seeking" study of the retarded at mental

age six, (2) to extend the battery of tests to clarify possible memory and fluency factors, (3) to hypothesize and test for the differentiation of two additional abilities — Semantic Reasoning and Immediate Memory for Figural Units — at this mental age, and (4) to utilize Guilford's model of the structure of intellect to encourage possible further separation of abilities. Seven abilities were hypothesized: Figural Identification, Verbal Comprehension, Fluency, Figural Reasoning, Semantic Reasoning, Immediate Memory for Symbolic Units, and Immediate Memory for Figural Units.

Subjects

A battery of 32 tests was administered individually to each of 100 children who were residents of three Florida institutions for the mentally retarded. The mean MA was 6-7 with a range from 5-1 to 7-10 years and a standard deviation of 8.5. IQ and CA data were not given.

Method

The 32 tests to be factor analyzed were selected such that, with the exception of three hypothesized under Semantic Reasoning, for each test used there were at least two others included with an identical Guilford three-way classification. Eight tests were identical to those used in the Pacific study. All nine subtests of the ITPA were used. Six additional tests were selected for their probable Guilford classifications. Finally, nine tests were designed to satisfy the minimum of three tests for each three-way classification.

These 32 tests were intercorrelated and the resulting matrix subjected to a principal components solution. The first five, six, and seven factors were rotated obliquely using Carroll's oblimin program (biquartimin criterion).

Results

Six of the seven hypothesized abilities were confirmed: Figural Identification, Verbal Comprehension, Immediate Memory for Figural (Visual) Units, Immediate Memory for Symbolic (Auditory) Units, Fluency, and Figural Reasoning. Only Semantic Reasoning was not confirmed, as the tests predicted on that factor loaded highest on Verbal Comprehension.

The ITPA subtest loadings are shown below:

A-V	Aut.	.50 Verb. Comp.
A-V	Assn.	.50 Verb. Comp.
A	Dec.	.48 Verb. Comp.
V-M	Seq.	.68 Vis. Mem.
V	Dec.	.46 Vis. Mem.
V-M	Assn.	.31 Fig. Reasn.

A-V Seq.	.81 Aud. Mem.
VE	.45 Fluency
ME	— (Nothing in 6 factor solution; loaded with Visual Decoding on a factor unknown and undescribable in the 7 factor solution.)

No ITPA subtest loaded on Figural Identification. Visual Decoding loaded higher on memory than might have been expected.

Comments

The results of this study were consistent with the Pacific study. Six abilities appeared to be differentiated to a considerable degree at the mental age of 6.5 years and additional abilities did not emerge even though the opportunity was provided by including at least three tests each for several Guilford three-way classifications.

GUNZBURG, H. C. The reliability of a test of psycholinguistic abilities (I.T.P.A.) in a population of young male subnormals. *Journal of Mental Subnormality,* 10, pt. 2, Dec. 1964, 101-112.

Purpose

The purpose of this study was to examine the suitability of the ITPA for use with adult retarded. The reliability of the test with such a population was explored.

Subjects

The subjects were 50 males in a British hospital for mental defectives. The chronological age range was 16 to 31 years with a mean of 19 years. WAIS full scale IQs ranged from 39 to 90 with a mean of 70.4. These 50 subjects were not selected in any way as they constituted the entire population of "trainable young men available at the time of testing."

Procedures

The ITPA was administered to all 50 subjects. After an interval of 1 to 14 months (mean 4½ months) the test was readministered to the 39 subjects who had had the pretest and were still in the hospital.

Results

The same patterns of deficits and strengths were found for all four IQ levels examined (IQ 40-54 through IQ $>$ 35). With the exceptions of Auditory Decoding and Auditory-Vocal Automatic, the ITPA was deemed "not too easy" for mentally subnormal adults. Group mean language ages

ranged from 6-8 to 8-6 on all subtests except Motor Encoding (6-3) and the two sequential tests (both 6-5).

The subtest test-retest correlations ranged from .38 to .79, with a total language age reliability of .83. The only subtests with reliability coefficients below .60 were Auditory Decoding (.38), Visual-Motor Association (.37), and Auditory-Vocal Automatic (.48). When these three subtests were eliminated from the original battery, the total raw scores of the shortened battery correlated .94 with the original full ITPA. A conversion table with equivalent raw scores of the shortened and full battery is provided.

Correlations between the 6 subtests of the shortened ITPA and WAIS IQs ranged from .33 to .55. Total language age (6 subtests) correlated .63 with WAIS IQ.

Comments

It is probable that the reported low reliabilities of the Auditory Decoding and Auditory-Vocal Automatic subtests are related to the fact that these are two of the three subtests on which these adult retardates were operating at or near the top of the norms. The low reliability of Visual-Motor Association is consistent with our clinical observations and not unexpected. The high performance of these British retardates on Auditory-Vocal Automatic is in striking contrast to the notably low performance of EMH retardates in this country. The difference could be related to fewer "familial" or "culturally deprived retardates" among the British adult group and/or to a generally higher level of grammatical performance across all social classes in Britain. It is also possible that grammatical skills as measured by the ITPA are learned at a much slower rate (more repetition required) by the retarded, but that they are learned eventually. All the studies in this country, which reveal a striking deficit in Auditory-Vocal Automatic, have been done with retarded children. If this is the case we would expect to find that adult retardates here would also eventually reach a comparably high level of grammatical performance. If this were found, it would raise interesting questions regarding what other skills might continue to develop in retardates after the age that formal or systematic instruction stops.

McCarthy, J. J., and Olson, J. L. *Validity Studies on the Illinois Test of Psycholinguistic Abilities.* Madison, Wisconsin: Photo Press, Inc., Xerlith Service, 1964 (available from Univer. of Illinois Press, Urbana).

Purpose

The purpose of the several studies reported in this monograph was to obtain preliminary information on the concurrent, predictive, content,

construct, and diagnostic validities of the ITPA. These exploratory studies were undertaken for three reasons: (1) the scarcity of validity data in the ITPA literature; (2) the desirability of stimulating further research; and (3) in anticipation of the construction of a final version of the ITPA, which is currently in an experimental edition.

Subjects

(a) *Concurrent and Predictive Validity Study.* Eighty-six children, ages 7-0 to 8-6 were selected on the basis of their resemblance to the standardization subjects of that age range. All children had Binet IQs between 80 and 120, none had serious sensory or physical handicaps, all were Caucasian and enrolled in public schools.

(b) *Content Validity Study.* Standardization data were used, as were data from later studies reported in the literature.

(c) *Construct Validity Study.* The same subjects used in the concurrent and predictive validity studies were employed.

(d) *Diagnostic Validity Study.* The same subjects described above were used plus 60 additional cases (cerebral palsied, deaf, retarded, speech problems and 10 standardization subjects).

Procedures

(a) *Concurrent and Predictive Validity Study.* It was planned that the administration of the ITPA be followed immediately (concurrent validity) by administration of the criterion tests (Binet L, Durrell-Sullivan, Stanford Achievement, Raven's Matrices, WISC Similarities, Language Sample, Draw-a-Man, Knox Cube, Random Word Test, Peabody Picture Vocabulary, Perceptual Speed (PMA), Sentence Memory, Peg Test, Visual Clozure Test, Auditory Clozure Test, Probability Test, Maze Test (Arthur Point). After a three-month interval, the criterion tests were to be readministered (predictive validity). Scheduling difficulties resulted in some deviations from this plan. Correlations were computed between the ITPA and both administrations of the criterion tests, although not all of the latter were employed in the predictive (re-test) study.

(b) *Content Validity Study.* Content validity was assessed by logical examination of the test and its method of construction. Five specifics are discussed: (1) how well the items of a given subtest represent the universe of items from which they were selected; (2) how psychologically similar the items from a given subtest are to each other; (3) the heterogeneity of the subtests within the battery; (4) the extent to which the subtests collectively sample all crucial linguistic abilities, and (5) the "single ability" character of the ITPA subtests.

(c) *Construct Validity Study.* The examination of the extent of influence of various factors on ITPA performance was fourfold: (1) the effect

of mental age, social class, birth order, number of siblings, and sex on ITPA scores were examined; (2) the effect of time was examined with reference to ITPA test-retest correlations for normal, retarded, and cerebral palsied children; (3) certain factors specific to given subtests (e.g., visual discrimination effect on Visual-Motor Sequencing) were examined; and (4) intra-channel, intra-level, and intra-process correlations among the ITPA subtests themselves were explored.

(d) *Diagnostic Validity Study.* Two procedures were employed: (1) correlating teachers' rankings on language ability with ITPA scores; and (2) determining the degree of success ITPA "experts" have in identifying types of exceptional children by profile inspection only.

Results

(a) *Concurrent and Predictive Validity Study.* On the basis of intercorrelations with selected criterion tests and retests, the following subtests appeared to possess clearly adequate concurrent and predictive validity: Visual Decoding, Visual-Motor Association, and Auditory-Vocal Sequencing. Auditory Decoding, Auditory-Vocal Association, and Visual-Motor Sequencing have qualified validity in that they appeared to assess more than was intended. The Vocal and Motor Encoding and Auditory-Vocal Automatic subtests were deemed of questionable or doubtful validity on grounds that they failed to correlate substantially with the selected criterion tests — Binet Vocabulary, Draw-a-Man, and Sentence Complexity, respectively.

(b) *Content Validity.* The authors conclude that each ITPA subtest is quantitatively homogeneous; that correlational and factor analytic studies demonstrate a "fair degree" of heterogeneity among ITPA subtests; that the automatic-sequential level subtests require further differentiation into single component abilities; the decoding tests are slightly contaminated with association and the Vocal and Motor Encoding tests are slightly contaminated by each other. Over all, the indices employed indicate to the authors a good "first approximation" to the goals of the test constructors.

(c) *Construct Validity.* Mental age was substantially and positively related to ITPA scores. Small negative correlations were found between ITPA scores and social class, birth order, and number of siblings. Sex and time (test-retest) did not appear to influence ITPA performance. Decoding scores were not influenced by "closure," encoding was not influenced by vocal or motor precision, association processes were independent of their nonmeaningful counterparts, and Visual-Motor Sequencing was not related to perceptual speed or visual discrimination. Auditory-Vocal Sequencing was more related to meaningful level tests than was predicted. Auditory-Vocal Automatic did not adequately assess the intended ability.

The hypothesized small relationships were found between same level and channel subtests, and to a lesser extent between same-process tests.

(d) *Diagnostic Validity.* Correlations of teacher rankings of children's over-all language ability and individual subtest area abilities with ITPA scores were not significantly different from zero. The authors state that faults in this part of the research design make it an inappropriate test of empirical validity. In the classification of profiles by type of exceptionality, all four ITPA "experts" were able to classify well beyond the chance level. The most frequent errors were made in distinguishing between profiles of normal children and those with articulation defects.

In conclusion, the authors suggest that the Encoding (especially Motor) and Auditory-Vocal Automatic tests deviate from the definitions in the manual. They also suggest the need for supplementary tests especially in the diagnosis of dyslexia. Within these limits, they suggest that from a clinical viewpoint, the ITPA has adequate validity.

Comments

These attempts to increase knowledge of the validity of the ITPA are noteworthy. However, the faults of parts of the diagnostic validity design, fully acknowledged by the authors, are particularly regrettable, since many ITPA users are most interested in this type of validity. The conclusions drawn from the concurrent, predictive, and parts of the construct validity studies depend almost entirely on the original selection of criterion tests.

Some of these choices might be questioned. For example, while the Peabody Picture Vocabulary Test was the criterion test for Auditory Decoding, the Visual Decoding requirements in the PPVT are perhaps as demanding as the auditory aspects of the task. Binet vocabulary with its presumably heavy loading of prior decoding and association was chosen as the criterion test for Vocal Encoding.

Although the "experts" were able to correctly classify types of exceptional children well beyond the chance level (in the second phase of the diagnostic validity studies), they still misclassified 47% of the profiles. However, when the subject-identifying data as presented in Appendices C-G are examined, reasons for some of the experts' mistakes become apparent. Two of the "cerebral palsied" children had IQs of 50 and 72. Another cerebral palsied child whose IQ was not given was 15-0 years old with a language age of 6-3. Three of the "EMH" children had IQs of 57, 48, and 59, while four of the "TMH" subjects' IQs ranged from 46 to 58.

However, the importance of these studies and of the fact that the ITPA

is being subjected to this kind of scrutiny is in no way diminished by these minor criticisms.

These studies have manifestly succeeded in contributing to all three areas of expressed purpose: (1) they have added materially to the validity data in the ITPA; (2) they undoubtedly will stimulate further research; and (3) they have contributed information useful for future ITPA revisions.

Remediation Studies

HART, N. W. M. The differential diagnosis of the psycholinguistic abilities of the cerebral palsied child and effective remedial procedures. *Special Schools Bulletin,* No. 2, Brisbane, Australia, 1963.

Purpose

The purpose of this study was to investigate the effects of a language program on cerebral palsied children. It was hypothesized that (1) a systematic language development program adjusted to the specific defects of cerebral palsied children would significantly enhance their total language age scores as measured by the ITPA and (2) as a result of such a language program, the experimental group would make more rapid progress in reading than the control group.

Subjects

The 18 subjects (9 matched pairs) were second graders at the School for Spastic Children, Queensland, Australia. Three pairs, not so precisely matched, were included to increase the sample size. There were no significant differences in mean CA, LA, or IQ between the experimental and control groups. The average LA for the experimental group was 5-0; for the control group 4-10. All children (mean IQ about 80) were grossly retarded in language development. The experimental group contained more athetoid children and four deaf or partially deaf children, whereas the control children all had normal hearing.

Procedure

All subjects were tested with the ITPA before and after the language instruction was given to the experimental group. The control group remained in their classes, whereas the experimental group was withdrawn for 45 minutes of special teaching each day for seven weeks. The language development program for the experimental group was aimed at developing the ability to decode, to associate, and to encode linguistic symbols. This program was applied at both the representational and automatic-sequential levels. Overlearning was sought, especially at the automatic-sequential level, in an attempt to give the children confidence to initiate oral language.

Results

The experimental group showed a mean total language age gain of 12.3 months while the control group gained 1.1 months during the seven week training period.

Pre- and post-test reading ages on the Hull Word Recognition Test revealed that the mean gain for the experimental group was nine months compared to a mean gain of three months for the control group. This difference, in favor of the experimental group, was significant beyond the .001 level.

Comments

This study suggests that a short-term language program can significantly increase the total language age of cerebral palsied children as measured by the ITPA. However, further investigation is necessary to determine retention of gains when such special programs end. The fact that appreciable gains in word recognition took place, presumably as an indirect result of the language program, may be highly important. The implications for early identification and successful remediation of some language deficiencies are evident and positive.

HERMANN, ANITA. An experimental approach to the educability of psycholinguistic functions in children. Unpublished master's thesis, Univer. of Illinois, 1962.

Purpose

The purposes of this investigation were (1) to make a psycholinguistic analysis of three siblings in a family with a four-generation history of mental deficiency and (2) to determine the effects of a short period of training on the psycholinguistic abilities of one sibling and one unrelated child with a similar psycholinguistic profile.

Subjects

The subjects for this study were three mentally retarded siblings, one of whom was trained with programmed remediation while the other two served as comparison subjects and received no training. A fourth subject from another family was also trained and served as her own control.

Procedure

Psychometric and psycholinguistic examinations were administered to the comparison siblings and the two experimental children before and after the three-month experimental training period. A genealogical study was conducted to explore factors in the family ancestry that might relate to the siblings' deficits.

The psycholinguistic deficit selected as a focal point in the training for both experimental subjects was Auditory-Vocal Automatic. The training sessions stressed proper use of singular and plural nouns, correct verb tenses, proper use of conjunctions, prepositions, possessives, and positive, comparative and superlative adjectives.

Results

The three mentally retarded siblings showed highly similar preremedial patterns of psycholinguistic assets and deficits, with assets centered in the visual-motor areas and deficits in the auditory-vocal areas. A four generation history of low level intellectual functioning was found in the maternal ancestry of the siblings, suggesting a similarity in intellectual functioning between the present and past generations of this family. The familiar questions of the relative effects of heredity and environment were raised, especially by the fact that the two comparison siblings' ITPA profiles become more similar over a 22 month period, while their daily milieus became less similar during that time.

Both children who received remedial instruction designed to ameliorate their Auditory-Vocal Automatic deficit made significant gains (about three years) in language age in this area. However, the comparison siblings who received no training also made significant gains in some psycholinguistic areas.

Comments

In some areas and some phases of investigation the case study method using a very small number of subjects is not only necessary but desirable. However, studies such as this are more appropriately used in generating further research hypotheses than in generalizing results. While it is clear, on the one hand, that substantial gains were made in the areas of remediation, it is also true that (1) the untrained comparison siblings made equally large gains and (2) many of the remedial activities were indistinguishable from the test items.

SMITH, J. O. Effects of a group language development program upon the psycholinguistic abilities of educable mental retardates. *Special Education Res. Monogr.*, No. 1, George Peabody College, 1962.

Purpose

The primary purpose of this study was to evaluate the effects of a group language development program with small groups of educable mentally retarded (EMR) children. It was hypothesized that (1) a systematic language program would significantly enhance the total language age scores as measured by the ITPA, (2) that IQ level would be unre-

lated to gains in ITPA total language age score, and (3) that initial language age level would be unrelated to gain in ITPA total language age score.

Subjects

The subjects in this study were 16 pairs of EMR children, matched on CA and ITPA total language age. All subjects were between 7 and 10 years of age, had Stanford Binet IQs between 50 and 80, were enrolled in public school classes for EMR children, and were free of visual, hearing, and physical impairments.

Procedure

The effects of this experimental language development program were measured by the mean difference in gain in ITPA total language age for the matched pairs.

For 11 weeks, the experimental children were trained in groups of eight for three 45-minute periods weekly. The controls remained in the EMR classroom. The group language program was general and developmental (rather than individualized or remedial) and was aimed at increasing the subjects' ability to decode (receive visual and auditory cues), to associate, and to encode (express verbally or through motor responses) linguistic symbols.

Results

The experimental group gained 6.75 months in mean language age and the controls showed a loss of .44 months during the 33-session program. This difference was highly significant ($p < .001$). Thirteen of the 16 experimental subjects made greater gains than their matched controls. Neither IQ nor initial language age was significantly related to gains in language age.

Comments

The omission of ITPA scores in any form other than profile makes it difficult to evaluate this study. The use of subtest scores rather than total language age would have added to the meaningfulness and usefulness of this study. Such questions as why the control group made no gains cannot be pursued without more data than the author gives. In a follow-up of these subjects twelve months later, Mueller and Smith (1964) found there were no longer significant differences between groups. They suggest a longer training period may be necessary to obtain permanent gains. Smith's daily lesson plans are detailed and specific, and as such, are a noteworthy contribution for those primarily interested in general developmental (rather than remedial) language programs.

BLESSING, K. R. An investigation of a psycholinguistic deficit in educable mentally retarded children: detection, remediation, and related variables. Unpublished doctoral dissertation, Univer. of Wisconsin, 1964.

Purpose

The purpose of this study was to explore the effects of intensive, small-group language remediation on Vocal Encoding. Retention of linguistic gains over a four-month interval after cessation of remediation and possible generalized effects of remediation on over-all language ability were also studied.

Subjects

Forty children, ages 8 years to 15 years (IQ's 50-80, MA's 4-7 to 8-10), enrolled in public school special classes, who were at least one year below MA in Vocal Encoding ability were selected. These forty were group matched on sex, sibling order, and parental occupation and then randomly selected for experimental and control groups.

Procedure

The experimental subjects received three one-hour sessions of clinical type instruction in vocal encoding behavior weekly for four months. All instruction was in groups of three to five children and was conducted by six student teachers in mental retardation or speech correction. All activities and training were under direct supervision of the investigator.

Interim evaluations were conducted at the end of the first, fourth, ninth, and fourteenth weeks, and four months after cessation of remediation.

Vocal encoding was assessed by that ITPA subtest, by Binet Vocabulary, Total Word Count, Mean Sentence Length, and Mean of the Five Longest Remarks.

Results

The experimental group made significantly greater gains than did the control group in ITPA Vocal Encoding ($p < .01$), Total Word Count ($p < .01$), Mean Sentence Length ($p < .01$) and Mean of Five Longest Remarks ($p < .01$). Long term retention (measured four months after end of instruction) scores favored the experimental group on all of these measures ($p < .01$), except ITPA Vocal Encoding which was not reassessed.

Over-all ITPA language age was not significantly affected by the specific Vocal Encoding program. Binet Vocabulary was similarly not affected. The author suggests that Binet Vocabulary is not a valid measure of Vocal Encoding.

Comments

This is a careful, scholarly study, and the author's interpretative comments regarding language development and training in educable retarded subjects are particularly recommended. Of special interest is the finding that before remediation, these subjects' mean Vocal Encoding score was six months below mental age, but at the end of treatment Vocal Encoding equalled or exceeded mental age. This suggests the particular need of retarded children for special Vocal Encoding programs such as Blessing has planned and evaluated.

One of the ITPA validity studies (McCarthy and Olson, 1964) reviewed here also found reason to question the appropriateness of Binet Vocabulary as a measure of Vocal Encoding.

BLUE, C. M. The effectiveness of a group language program with trainable mental retardates. Unpublished report, Appalachian State Teachers College, Boone, North Carolina, 1963.

Purpose

This study was designed to investigate the immediate effect of a language development program on trainable retardates.

Subjects

Twenty-four trainable retarded children (IQs 25 to 55) in attendance in the Orange Grove School in Chattanooga, Tennessee were the subjects. They ranged in CA from 8-4 to 17-9 and none had sensory defects. Subjects were matched for CA and total language age obtained from ITPA pretesting. Six males and six females were in the control group; seven males and five females comprised the experimental group.

Procedure

The experimental group was subdivided into two groups on the basis of CA. The older group's CAs ranged from 13-4 to 17-9 and the younger group's from 8-4 to 13-2. The children had specific language teaching during three 45-minute periods per week for 11 weeks. The objectives, materials and methods in the language program were those outlined by Smith (1962). At the end of the training program all subjects were retested with the ITPA by the same examiner.

Results

The experimental subjects made a mean language age gain of 5.67 months compared to the control mean of 3.67 months. This difference was not significant ($t = 1.02$). However, the mean gain of two months by which the experimental subjects exceeded the control subjects was

interpreted as supporting the value of such a language development program for trainable retardates.

Comments

The apparent importance of age is reflected in this study. The younger group of experimental subjects made a mean gain of 8.33 months as opposed to a mean gain of only 3 months for the older age group. However, the younger control children also gained 7 months, while the older control group gained only .3 of a month.

This suggests that age, rather than the language training program, may have been a major factor affecting post-test scores. Although IQ data are not presented, it can be inferred that the younger children's IQs were substantially higher because their mean language age was only 2 months below that of the older children, even though they were, on the average, 50 months younger.

Two serious limitations are apparent in this study: (1) the short term (33 sessions) training program and (2) the small size and heterogeneity of the sample. However, the study does suggest that the younger and brighter the subjects are, the more positive may be the results obtained from language training.

PAINTER, GENEVIEVE B. The effect of a rhythmic and sensory-motor activity program on perceptual-motor-spatial abilities of kindergarten children. Unpublished master's thesis, Univer. of Illinois, 1964.

Purpose

This study involved the design, execution, and evaluation of a systematic motor-activity program for kindergarten children. The effects of the program on three separate areas were examined: (1) body image as measured by the Goodenough Draw-A-Man; (2) visual-motor integrative skills as measured by the Beery-Buktenica Developmental Form Sequence and an author-devised motor test and; (3) language behavior as measured on the ITPA.

Subjects

The twenty normal public-school kindergarten children who scored below the class median on the Goodenough Draw-A-Man test comprised the subject pool. These twenty subjects were divided into two matched groups — experimental and control. The groups were matched on Binet IQ (E = 93.3, C = 94.7), CA (E = 5-7, C = 5-6), Binet MA (both groups = 5-3), Goodenough MA (both groups = 5-8), and on sex (4 males and 6 females in each group).

Procedure

A systematic sequence of sensory-motor activities, designed in accordance with theoretical constructs of Kephart and Barsch, was presented to the experimental group in 21 half-hour sessions over a seven-week period. The control subjects remained in their regular kindergarten class during the experimental group's training periods.

The Goodenough Draw-A-Man, Beery-Buktenica Developmental Form Sequence, ITPA, and a sensory-motor-spatial test were administered to both groups before and after training. Experimental and control group gain scores were compared.

Results

The experimental group's gain was superior to the control's gain in all expected areas: Draw-A-Man ($p = .05$), Beery-Buktenica ($p < .005$), sensory-motor-spatial ($p < .005$), and ITPA Motor Encoding ($p < .05$).

On the ITPA, the experimental group mean gain in Motor Encoding was 27.2 months, compared to 3.4 months mean gain for the control group ($p < .05$). The experimentals also significantly exceeded the control's gain in Auditory-Vocal Association. The control subjects made slightly greater gains than did the experimentals in Vocal Encoding and in Visual-Motor Association. During the time the experimental subjects were receiving training, the control children were having "share-and-tell time" (Vocal Encoding?) and movies (Visual Motor Association?). The experimental group made slightly larger gains in the remaining five ITPA subtests. Presumably this was a general experimenter, halo, or Hawthorne effect.

Comment

This study represents the first major attempt known to the reviewer to derive systematically an activity program from theoretical formulations. The nine movement areas used (Barsch's Movigenic theory) were visual dynamics, auditory dynamics, dynamic balance, spatial awareness, tactual dynamics, body awareness, rhythm, unilateral and bilateral movement, and flexibility. Each exercise used in the training program is described and analyzed in several very valuable appendices. A complete case history record of one child's participation in sixteen training sessions is also included. Painter's study is an important contribution which can serve as a guide in the planning of remedial programs and it attests to the efficacy of such programs executed in a group situtation within a regular public school kindergarten.

McCarthy, Jeanne McRae. Patterns of psycholinguistic development

of mongoloid and non-mongoloid severely retarded children. Unpublished doctoral dissertation, Univer. of Illinois, 1965.

Purpose

This study explored three questions: (1) On what psycholinguistic abilities, as measured by the ITPA, do matched groups of mongoloids and non-mongoloids differ? (2) Does intra-test variability reveal significant differences between the two groups and are these differences, if any, reflected in the number of psycholinguistic disabilities found in each group? (3) Do the psycholinguistic abilities of mongoloid children show a homogeneous pattern not found among non-mongoloids?

Subjects

Thirty mongoloid and 30 non-mongoloid children were matched on CA, MA, and IQ. Both groups had a mean CA of 112 months and a mean MA of 49 months. The mongoloid group mean IQ was 45.5 compared to 43.6 for the non-mongoloids. All children were enrolled in Illinois day classes for retarded children.

Procedure

The Stanford Binet L-M, the ITPA, a visual closure test and a sentence memory test were individually administered by the investigator to each subject.

Data analyses for the first question included comparisons of group ITPA profiles, group subtest means, and group performances on the dimensions of the ITPA model — levels, channels, and processes. The method of data analyses to answer the second question involved computation of each child's total subtest deviations from his own mean language age and evaluation of direction and magnitude of these deviations for both groups. Patterns of highest and lowest subtest scores for the children in both groups were compared to provide data on the third question.

Results

Major findings (numbers correspond to the three questions as listed in the purpose section) of this study included the following:

(1) The only psycholinguistic abilities on which the groups differed were Motor Encoding (mongoloids superior, $p = .01$) and Auditory-Vocal Automatic (non-mongoloids superior, $p = .08$). There were no significant differences between the groups at either (a) the representational or the automatic-sequential level; (b) the visual or auditory channel; (c) the decoding or association process. However, the mongoloids' superiority in Motor Encoding was marked enough to make their total encoding

processes superior to the non-mongoloids even in the absence of a difference between the groups in Vocal Encoding.

(2) The analysis of intra-test variability revealed that mean deviations from mean language age were greater in the mongoloids (p. = .02) and the variance was also greater (p. = .05). The mongoloid group showed greater deviations above but not below mean language age (p. = .05). When a deviation of 24 months below mean language age was used as the definition of a severe psycholinguistic disability significantly more (p. = .05) mongoloids (N = 15) than non-mongoloids (N = 9) had such disabilities. More mongoloids (N = 20) than non-mongoloids (N = 13) also had deviations of more than 24 months above mean language age.

(3) An examination of the homogeneity of profile patterns in the two groups by comparisons of combinations of high and low subtests revealed that the mongoloids were significantly more homogeneous. They were characterized by highs in Motor Encoding and lows in Auditory-Vocal Automatic.

There were no differences between the two groups on the supplementary visual closure or sentence memory tests.

Comments

The major findings of this study appear to be the relative superiority of the mongoloids in Motor Encoding and the absence of other psycholinguistic differences, the presence of greater deviations and therefore more psycholinguistic disabilities among the mongoloids, and the homogeneity of psycholinguistic patterning within the mongoloid group.

The author suggests that the educationally significant deficits in the retarded lie in cue selection and in the ability to integrate information from different modalities. Recommended educational practices derived from this study include the use of labelling or verbal coding, "acting out" of visual or auditory stimuli, and sensory training. "Say and do" tasks are highly recommended for training hypothesized deficiencies in association between the verbal and motor signaling systems.

MUELLER, M. W. Comparison of psycholinguistic patterns of gifted and retarded children. *Selected Convention Papers,* 42nd Annual CEC Convention. Washington, D. C.: Council for Exceptional Children, NEA, 1964, 143-148.

Purpose

The purpose of this study was to test four specific hypotheses concerning the ITPA profiles of gifted and retarded children: (1) gifted are higher on the auditory-vocal subtests than on the visual-motor subtests, and the retarded show the reverse; (2) gifted are higher on total ITPA language age than on mental age and the reverse is true for retarded; (3) gifted are higher on association subtests than on other subtests, but this is not true for retarded subjects; (4) gifted show a greater superiority to retarded on representational level subtests than on automatic-sequential level subtests.

Subjects

Three groups of 21 subjects each, matched on mental age, were used in this study. The gifted group ($\overline{CA} = 61.00$ months) mean IQ was 132.1; the mean IQ of the EMR group ($\overline{CA} = 128.00$ months) was 63.6; and the mean IQ of the TMR group ($\overline{CA} = 189.52$ months) was 41.8. The mean MA of all three groups ranged from 79.5 to 81.3 months. The groups were comparable in terms of race and sex.

Procedure

The ITPAs were administered according to the directions in the manual. Language age scores were used in the analyses of variance and the graphic data presentation.

Results

The most clear-cut finding of this study was that the retarded subjects showed a notable language deficit independent of mental age. The magnitude of the difference between LA and MA increased significantly as IQ decreased. Considerable support was found for a relative superiority of the retarded on visual-motor tests and of the gifted on auditory-vocal tests. Retardates also showed a severe encoding deficit.

In general, some support was found for hypotheses 1 and 3. Hypothesis

2 was supported in direction but not magnitude and no support was found for hypothesis 4.

The authors noted the consistency of pattern found among the retardates' profiles.

Comments

The group profiles presented in this study are similar in most respects to those for similar retarded groups (Bateman and Wetherell, 1965). The unsolved problems regarding the most effective methods of profile analysis whereby one can simultaneously compare profile level and shape are more than mildly frustrating and make clear, meaningful descriptions very difficult.

The concern of the author of this study with relations between MA and ITPA LA needs clarification. He states that "it may be the norms on the ITPA are not completely appropriate for children in middle Tennessee which could account for all groups obtaining LA scores below their MA." The ITPA was not designed as a second Binet and is not intended to represent in the same proportion or weighting the types of cognitive factors which go into an MA. While one could argue cogently that, since both MA and LA are derived from concepts of what representative children do at given CAs, a correspondence should be found, it nevertheless is apt to be misleading should one infer that any given relationship "should" exist between MA and LA. Perhaps it is true that middle Tennessee children do less well on ITPA items than on Binet items, but this does not necessarily reflect on the "appropriateness" of either norms.

The hypothesis that retarded children would do relatively less well on representational subtests than on those at the automatic-sequential (integrative) level is one which has been consistently refuted (see Bateman and Wetherell, 1965) but which still occurs frequently. Two explanations seem possible: (1) the terms "representational" and "integrative" do not adequately convey what functions are actually tested and thereby mislead some into thinking that, on the basis of previously known characteristics of retardates, they should perform as hypothesized; or (2) the knowledge that retardates have a relative deficiency in the automatic-sequential functions is actually new knowledge and is particularly significant because it casts doubt on some of the assumptions underlying several common educational procedures with the retarded.

MUELLER, M. W., AND WEAVER, S. J. Psycholinguistic abilities of institutionalized and non-institutionalized trainable mental retardates. Unpublished paper, George Peabody College (speech presented at Allerton Park Peabody College-IREC Conference, 1963). (Study reviewed in

Mueller, M. W., Peabody College Research on the Illinois Test of Psycholinguistic Abilities, *Selected Convention Papers,* 41st Annual CEC Convention. Washington, D.C.: Council for Exceptional Children, NEA, 1963, 183-187.)

Purpose

The purpose of this study was to compare the language abilities of TMR children in day schools and in institutions.

Subjects

Forty pairs of subjects (one institutionalized and one from a day school) matched for sex, race, IQ, and CA were employed. Mean CA for both groups was approximately 14-5 years; $\overline{MA}$ 6-0; and $\overline{IQ}$ 42.

Procedure

The ITPA was administered to each subject and group mean subtest scores compared. A speech rating scale was also administered.

Results

The institutionalized TMR subjects scored higher than the matched day school subjects on total language age, on all ITPA subtests, and on the speech rating scale. The mean total language age for all subjects was about 19 months below the mean Binet MA. The profiles were essentially the same shape for both institutionalized and non-institutionalized subjects. Performance on the visual-motor subtests was generally higher than that on the auditory-vocal subtests. Significant correlations were obtained among MA, LA, and speech ratings. ITPA language age correlated higher with MA than with the speech rating score.

Comments

The authors suggest three possible reasons for the unexpected superiority of the institutionalized subjects: (1) their greater involvement in and enjoyment of the testing situation; (2) a possible, but unlikely, greater emphasis in language development in the institution school program than in the day school program; and (3) chance ($p < .005$).

This study adds to the now firmly established picture of ITPA performances of groups of retardates. The typical automatic-sequential level deficit is present in both groups but most pronounced in the day school subjects.

Kass, Corrine E. Some psychological correlates of severe reading disability. Unpublished doctoral dissertation, Univer. of Illinois, 1962.

Purpose

The purpose of this study was to explore some psychological correlates of severe reading disability.

Subjects

The sample consisted of 21 children with reading disabilities who met the following criteria: (1) CAs between 7-0 and 9-11; (2) within the normal range of intelligence; (3) in the second, third or fourth year in primary grades (including repeaters and not counting kindergarten); (4) retarded in reading as determined by the Monroe battery of diagnostic reading tests (one-half year retarded if in second year in school; and one and one-half years retarded, if in third year; and two and one-half years, if in the fourth year); and (5) no known auditory or visual impairment.

Procedure

The psycholinguistic model of the ITPA was used as a basis for the study, supplemented by five tests at the automatic-sequential level of psycholinguistic functioning. These tests were (1) Visual Automatic, (2) Sound Blending (Monroe), (3) Mazes (WISC), (4) Memory for Designs (Graham-Kendall) and (5) Perceptual Speed (PMA).

Results

The children with reading disabilities showed deficits ($p < .01$) in the following subtests: Sound Blending (Monroe), Visual-Motor Sequential (ITPA), Perceptual Speed (PMA), Mazes (WISC), Memory for Designs (Graham-Kendall), and Auditory-Vocal Association (ITPA). Marginal deficits ($p < .10$) were found in Visual Automatic and in Auditory-Vocal Automatic (ITPA). In brief, the reading disability children were deficient in seven out of eight abilities at the automatic-sequential level of language usage and in only one of six representational level abilities.

Comments

Although this sample of reading disability cases was small, a clear pattern of deficits in integrative functions such as closure, sequential memory, and rate of recognition emerged. The author relates these deficiencies to possible brain stem dysfunctions which limit symbolic storage. A primary implication of this study for remedial reading is that more research is needed on developing techniques to improve these integrative (automatic-sequential) processes rather than continuing a focus on representational processes.

SUTTON, PEGGY. The relationship of visualizing ability to reading. Unpublished master's thesis, Univer. of Illinois, 1963.

Purpose

The purpose of this study was to determine whether high achievers on

conventional reading tests score higher on certain visualization tests than do low achievers of comparable mental age.

Subjects

Two groups, each composed of twelve educable mentally retarded children, were selected from special classes in a midwestern city. The groups were matched on MA, CA and IQ. Mental ages ranged from 6-6 to 8-0 and CAs ranged from 8-10 to 11-2. Group H consisted of children who scored above their mental age reading grade expectancy on the Gates Basic Reading Test, and Group L consisted of children who scored below their mental age reading grade expectancy.

Procedure

Six tests of visual memory were individually administered to the 24 children. Two tests utilized letters, one with a copying response and one with a recognition response; two tests utilized forms, one with a copying and one with a sequencing response (Visual-Motor Sequencing subtest of the ITPA); and two tests utilized designs, one with a copying and one with a recognition response. A *t* test for the difference between means for the two groups was performed for each test.

Results

The high reading achievers scored significantly better than the low achievers on the tests of letter recognition in non-meaningful material and the writing of letters in consonant groups. The high reading achievers also scored higher, but not significantly so, on the two tests which involved the sequencing (ITPA Visual-Motor Sequential) and the writing of forms. There were no differences between the high and low achievers on the two tests involving the reproduction and recognition of designs.

Comments

The results of this study are consistent with earlier research which suggets that the closer a visual memory test is to reading itself, the higher will be the correlation with reading ability.

HIRSCH, ESTHER. Training of visualizing ability by the kinesthetic method of teaching reading. Unpublished master's thesis, Univer. of Illinois, 1963.

Purpose

The purpose of this study was to explore the effect of a kinesthetic method of teaching reading (with meaningful material) on sequential visualizing abilities (with non-meaningful material) utilizing both visual-motor and visual-recognition responses.

Subjects

Fourteen educable mentally retarded children, matched on mean scores on four visualization tests (including the ITPA Visual-Motor Sequential subtest) and the Gates Primary Test of Word Recognition, served as subjects. Seven subjects were randomly assigned to the experimental group while the others served as the control group. All children were essentially nonreaders.

Procedure

Four tests of sequential visual memory were administered to all subjects before and after the training period. Test I was the Visual-Motor Sequencing subtest of the ITPA. Test II was composed of symbols from the McKee alphabet and required a written response from memory. Test III was composed of nonsense words such as *rhu* and *rniuk,* and required the child to select the correct response from a choice of four visually presented nonsense words. Test IV was the same as III, but required a written response. A five-second stimulus exposure time was employed in all four of these tests of visual memory for discrete elements.

The experimental group received 20 days of training in the Fernald kinesthetic method on five words daily. The control group received no training.

Results

The experimental group, whose training was on meaningful material, obtained higher total change scores ($p < .05$) than the control group which received no training. Although the results on all four tests were in the predicted direction, the gains on only those two tests which shared at least one variable (nature of stimulus material or nature of response) with the training showed statistical significance.

Comments

The small sample and short training period used in this pilot study preclude any strong conclusions or generalizations. The findings do suggest, however, that the kinesthetic method of teaching reading may be an appropriate technique for training certain types of visual retention abilities.

RAGLAND, G. G. The performance of educable mentally handicapped students of differing reading ability on the ITPA. Unpublished doctoral dissertation, Univer. of Virginia, 1964.

Purpose

The purpose of this study was to explore specific factors which con-

tribute to the consistent lag of reading achievement below predicted expectancy in EMH children.

Subjects

Fifteen EMH children who were retarded readers (reading level one or more years below WISC MA equivalent) and 15 EMH who were non-retarded readers (reading level no more than 6 months below MA) were selected from a residential school for special education students. All subjects had CAs between 12 and 16 years, MAs between 6-6 and 10-0 years, WISC IQs between 48 and 79, had no uncorrected physical or sensory impairments, and had been enrolled in the school for at least one year. The two groups did not differ on any of these factors. Mean reading grade for the retarded readers was 1.4 compared to 3.5 for the non-retarded readers.

Procedure

The ITPA was administered to all subjects. Analysis of variance and t tests were employed to compare the ITPA performances of the two groups.

Results

The retarded readers were significantly inferior to the non-retarded readers on Auditory-Vocal Automatic, the total automatic-sequential level, and total language age. Both groups' LA was below MA. The retarded readers scored less well on all subtests except Visual Decoding and Vocal Encoding.

Comments

This study, in conjunction with that of Kass (1962) and clinical experience strongly suggests that the psycholinguistic factors which relate to reading are those at the non-meaningful, automatic-sequential level. Ragland found, as did Kass, that retarded readers do as well as expected or even better, in visual decoding which is defined as understanding the visual symbol. The evidence is mounting that we need to critically re-evaluate the emphasis on reading as a meaningful process of comprehension and refocus on the arbitrary, mechanical non-meaningful aspects of word recognition.

BATEMAN, BARBARA. Reading and psycholinguistic processes of partially seeing children. *CEC Research Monogr.*, Series A, No. 5, 1963.

Purpose

The purpose of this study was to investigate the effects of visual defect on the reading and psycholinguistic processes of partially seeing children.

Subjects

The subjects were 131 children, grades one through four, enrolled in 20 Illinois resource room and special class programs for the partially seeing. The ratio of boys to girls was 3:2. Their intelligence scores were normally distributed, with a mean IQ of 100. About 40% of the children had visual acuity better than 20/70 and 20% were legally blind. The remainder fell between 20/70 and 20/200. The girls had significantly more severe visual defects than the boys. The children with refractive errors were less severely visually handicapped, were older, and had lower IQs than the children with other types of eye conditions.

Procedure

The ITPA was administered to all subjects in grades one through three and to two fourth graders (N = 93). The Monroe reading battery was administered to all third and fourth grade children and to selected second grade children (N = 96). Fifty-nine subjects were given both batteries. Information on visual acuity and eye condition was obtained from current reports by eye specialists. Most data analyses were descriptive or nonparametric, although t tests and Pearson r's were used when appropriate.

Results

Analysis of the reading tests showed that as a group these partially seeing children read less than one-half month below grade level, although they read six months below mental age. The children with mild visual defects read least well.

On the auditory-vocal channel subtests of the ITPA, the partially seeing children did not differ from the normal standardization population. Although the total group was significantly lower on the visual-motor subtests than were the standardization subjects, this was primarily due to the lowering effect of the legally blind group. The children with visual acuity greater than 20/200 showed no Visual-Motor Association deficit and only a mild Visual Decoding deficit.

Reading achievement was correlated positively with the three ITPA subtests at the automatic-sequential level.

Comments

This study was one of the first to suggest that reading is dependent on automatic-sequential functions as assessed by the ITPA. The author interpreted the psycholinguistic performances of the mild, moderate and severe visual defect groups as indicating that the ITPA primarily measures central rather than peripheral processes. This needs further verification.

Olson, J. L. A comparison of receptive aphasic, expressive aphasic, and

deaf children on the Illinois Test of Psycholinguistic Abilities. Unpublished doctoral dissertation, Univer. of Illinois, 1960.

Purpose

The purpose of this study was to compare the performances of receptive aphasic, expressive aphasic, and deaf children on the ITPA. It was hypothesized that such comparisons would yield differing response patterns among these experimental groups and therefore point the way toward a more effective method of differential diagnosis.

Subjects

Subjects were chosen to meet these criteria: (1) between 5-0 and 9-6 years old; (2) IQs as close to the normal range as possible; (3) no compound sensory defect; (4) competent clinical diagnosis of deafness, receptive aphasia, or expressive aphasia. Twenty-seven receptive aphasics and 25 deaf children from Central Institute for the Deaf and 14 expressive aphasics from the Institute of Logopedics were selected.

Procedure

Receptive aphasic (RA), expressive aphasic (EA) and deaf (D) children were compared to discover how they differed in their performances on the ITPA. The ITPA profiles of the RA, EA, and D children were also compared to theoretically expected profiles predicted from the known language characteristics of the children. Finally, the clinical diagnoses of selected cases were compared to the ITPA linguistic diagnoses.

Results

A covariance analysis showed that the ITPA discriminated among the three groups of linguistically handicapped children on all subtests except Auditory-Vocal Sequential. The Deaf were superior to the Receptive Aphasic group on Visual-Motor Association, Auditory Decoding, Vocal Encoding and the Auditory-Vocal Automatic subtests. The RA group was significantly superior to the EA group in Motor Encoding. Both of these groups scored relatively high and did not significantly differ on visual-motor tests. Both groups were low on expressive vocal language. The EA children were significantly superior to the RA group on Auditory Decoding, Auditory-Vocal Association, Auditory-Vocal Automatic, and Auditory-Vocal Sequential subtests. These results indicate that the differentiating pattern for EA and RA groups is in auditory input and motor expression.

By using the language characteristics of the experimental groups and clinical data, a predicted ITPA performance was computed for each child. The D and RA groups present a rather stable linguistic handicap in auditory input and their profiles were predictable far above the chance

level. On the contrary, the EA group was not easily predicted. It was the author's opinion that this unpredictability is due to the fact that the ITPA provides a psycholinguistic diagnosis which is more specific than a global clinical diagnosis. The individual case studies for the EA children indicated that their profiles differed markedly from each other. Thus, expressive aphasic children are not, psycholinguistically speaking, a homogeneous clinical entity.

Comments

This study indicates that clinically diagnosed receptive aphasic children achieve a profile of scores on the ITPA which leads to a linguistic appraisal similar to the clinical diagnosis, thus adding to the ITPA's construct validity. The instrument was also found to provide slight but statistically significant differences between receptive aphasic and deaf children. Furthermore, it offered evidence that expressive aphasic children, as globally diagnosed, are not actually a linguistically homogeneous group.

REICHSTEIN, J. Auditory threshold consistency: a basic characteristic for differential diagnosis of children with communication disorders. Unpublished doctoral dissertation, Teacher's College, Columbia Univer., 1963.

Purpose

The purpose of this study was to compare the consistency of auditory threshold responses of a group of peripherally hard of hearing children and a group of receptive aphasic children. The ITPA was one instrument used to confirm the differential diagnosis of the referral institution.

Subjects

Each group (peripherally hard of hearing and receptive aphasic) contained 24 children between the ages of 4½ and 6½ years. The mean IQ was 107 for the hearing loss group and 102 for the aphasic group.

Procedure

The ITPA was administered to all experimental subjects. The five auditory-vocal channel subtests were also administered to a group of normal children ($\overline{IQ}$ 114).

Results

The hard of hearing group was superior to the aphasic group on all subtests. The superiority of the hard of hearing group was significant at the .001 level on all auditory-vocal (A-V) channel subtests; at the .01 level on Visual Decoding; the .05 level on Visual-Motor Association;

and was not significant on Visual-Motor Sequencing and Motor Encoding.

When the five A-V channel subtests were analyzed for the group of normal children it was found that the mean A-V channel language age exceeded the mean CA by 8 months. Only two of the normal children had mean A-V language ages below their CA. This finding is what would be expected on the basis of the group mean IQ of 114.

Comments

The findings of this study parallel Olson's (1960) findings to some extent. Olson found significant differences between deaf and receptive aphasic subjects on Visual-Motor Association, Auditory-Vocal Automatic, Auditory Decoding, and Vocal Encoding. Reichstein suggests that the differences between his findings and those of Olson may be related to the fact that Olson's subjects were, on the average, two years older.

MYERS, PATRICIA. A comparison of language disabilities of young spastic and athetoid children. Unpublished doctoral dissertation, Univer. of Texas, 1963.

Purpose

The purpose of this investigation was to make a comprehensive study of language disabilities of spastic and athetoid types of cerebral palsied children through the use of the ITPA. The major proposition tested was that samples of subjects representing the spastic and athetoid categories of cerebral palsy differ in specific and in over-all psycholinguistic abilities, not only from one another but also from a sample drawn to represent non-handicapped children from the ages of four through nine years.

Subjects

One hundred twenty-four subjects were tested, of which 24 were athetoids, 68 were spastics, and 32 were normals. The subjects were all between 4-0 and 9-0 years inclusive; mental ages were between 3-4 and 9-0 inclusive; all IQs were 80 or over; none had severe visual, hearing or speech defects. A medical diagnosis of cerebral palsy of either spastic or athetoid type was prerequisite for inclusion. It was the investigator's intent to select subjects who were essentially normal except for motor impairment.

Procedure

The ITPA was administered to all subjects by the investigator at test sites selected for their lack of distracting auditory or visual stimuli. The Vineland Social Maturity Scale and the McGuire and White Index of

Value Orientation were also administered to all subjects. The short form of the Binet was given where necessary for complete data.

Computer programs developed at the University of Texas were utilized to estimate the ITPA scores of each subject "corrected" for variations in CA, MA, mental function (Binet IQ), social age (Vineland) and social status (IVO Index Values). The resultant adjusted means for subjects in the athetoid, spastic, and normal samples were obtained for each of the nine subtests of the ITPA.

Results

Normal children were clearly superior to both cerebral palsied groups on over-all psycholinguistic ability. Athetoid children were superior to spastics on two tests at the representational level, but were inferior on the tests at the automatic-sequential level. There was no difference between the two cerebral palsied groups in over-all psycholinguistic ability. Spastics were equal to normals on tests at the automatic-sequential level, but inferior on the remaining tests. Athetoids were equal to normals on three of the six tests at the representational level and inferior on the other tests. Two factors, a Representational Level factor, and an Automatic-Sequential Level factor, were extracted when the data for the cerebral palsied were factor analyzed. Athetoids were superior to spastics on the representational factor; spastics were superior on the automatic-sequential factor. Discriminant analysis demonstrated that the ITPA was adequate to separate the three groups used in this study.

The author concluded that the ITPA is capable of discriminating between spastics and athetoids. In terms of Osgood's theory relating language function to neural organization, spastics responded to the test as it was postulated they would. The athetoids were noticeably poorer on tests at the representational level than was expected. For this reason, it was tentatively concluded that the athetoids in this sample showed evidence of having more diffuse brain damage than the spastics. The spastics responded as expected for a group with cortical damage. The athetoids responded as a group with subcortical and cortical damage. From this study it appears the ITPA is an effective diagnostic tool for use with young spastic and athetoid children.

Comments

The ITPA is not designed or intended for use as an assessor of neurological damage, and the inference of direct relationship between such damage and psycholinguistic functioning is perhaps premature, but undeniably interesting.

FERRIER, E. E. An investigation of psycholinguistic factors associated with functional defects of articulation. Unpublished doctoral dissertation, Univer. of Illinois, 1963.

Purpose

The purpose of this study was to investigate psycholinguistic factors as they are related to functional articulation defects.

Subjects

Forty elementary school children with articulation defects, chronological ages 6-7 through 8-7, were chosen from three central Illinois cities. Visual and auditory acuity were within normal limits. Mean IQ (Peabody Picture Vocabulary Test) was 98. All were referred by speech correctionists who had evaluated their articulation defects as moderate to severe.

Procedure

All subjects were individually administered the following tests: (a) ITPA, (b) Templin-Darley 176 Item Diagnostic Test of Articulation, (c) Wepman Auditory Discrimination Test, (d) Gates Sound Blending Test, (e) A Test of Diadichokinesis, (f) Cerebral Dominance, (g) Copy Drawing of a Diamond.

Results

Three major findings resulted: (1) children with functional defects of articulation scored significantly lower than children without these defects on the three ITPA subtests at the automatic-sequential level and on the auditory-vocal channel subtests at the representational level; (2) subgroup (mixed dominance, visual-perceptual deficit, etc.) comparisons failed to show clear differences between those children with these specific problems and those without, except for those breakdowns based on MA, CA, sex, and tongue grooving ability; (3) the ITPA profiles of children with functional articulation defects resemble those found for other groups of "defective children," especially expressive aphasics.

Comments

The author very cogently discusses the possible causal relationships between defects at the automatic-sequential level of psycholinguistic functioning and resulting representational level problems. He also suggests a possible continuum leading from relatively mild articulation problems to severe expressive aphasia.

FOSTER, SUZANNE. Language skills for children with persistent articulatory disorders. Unpublished doctoral dissertation, Texas Women's Univer., 1963.

Purpose

This study was designed to explore relationships between psycholinguistics abilities and persistent articulatory defects.

Subjects

Eighteen children with persistent articulatory disorders were selected according to the following criteria: (a) male, (b) IQs from 90 to 100, (c) distribution among lower, middle, and upper socioeconomic levels, (d) no known physical abnormalities, (e) a hearing threshold of 20 dbs, (f) 20/20 vision, (g) CA between 7 and 9 years, and (h) no significant improvement on the Templin-Darley Articulation Test Form after 16 months of speech therapy. A control group of children with no deviant speech was matched to the experimental group.

Procedure

The ITPA was individually administered to both groups to (a) establish areas of psycholinguistic difficulty for the eighteen boys with persistent articulation problems and (b) determine whether these areas suggest auditory imperception, visual imperception or other possible causes for the dysarticulation.

Results

Children with persistent speech disorders performed significantly lower than the controls (raw score means) on the following subtests: Auditory-Vocal Automatic, Auditory-Vocal Sequential, Visual-Motor Sequential, Visual Decoding, Visual-Motor Association, and Vocal Encoding. The following explanatory hypotheses were offered: (a) poor auditory and visual sequential memory may have interfered with memory for correct speech patterns; (b) visual imperception was suggested by the low performance in visual areas; (c) avoidance of vocal expression perhaps produced the deficit in Vocal Encoding.

Comments

When the author's data were reevaluated in terms of language ages, it was found that the control subjects were at or above the top of the norms on all nine subtests. The experimental children were between the seven and eight year level on the three automatic-sequential level subtests and were between 8-0 and 8-6 years on both association tests. All other tests were above norms. The appropriateness of the author's raw score analysis is questionable, as is the meaningfulness of the test with the age range used. The fact that the control children scored higher than the experimentals on all nine subtests suggests that the matching of the two groups may not have been adequate. IQ data other than range are not presented for either group.

HASTEROK, G. S. The learning performance of retarded children with visual and auditory sense modality disabilities. Unpublished doctoral dissertation, Univer. of Illinois, 1964.

Purpose

The purpose of this study was to determine how well mentally retarded subjects could perform in learning complex tasks presented on their weaker psycholinguistic channel (auditory or visual) as measured by the ITPA. Three specific questions were asked: (1) Will mentally retarded children learn a complex task more rapidly by means of a proficient or a deficient sense modality? (2) Can learning performance of a deficient modality be improved so that it approaches or equals the learning performance of a proficient modality? (3) Will the difference in levels of performance between two tasks, one auditory and one visual, be the same for children with auditory sense-modality disabilities as it is for those with visual sense-modality disabilities?

Subjects

Ten mentally retarded children who met the following criteria served as subjects in this study: (1) Binet or WISC IQ above 45; (2) CA between 10-11 and 14-11 years; (3) no impairment in visual or auditory acuity; (4) intelligible speech; (5) a discrepancy of one standard score between the Auditory-Vocal Sequential and Visual-Motor Sequential subtests of the ITPA; and (6) a lower score in at least one other subtest of same sense modality in which they scored lower on the sequencing test. All subjects were enrolled in a state residential school for mentally retarded. Five subjects were designated (on the basis of criteria 5 and 6 above) auditory-low, and five designated visual-low.

Procedure

Each subject served as his own control in learning paired-associates by each of two methods — one visual and one auditory. Sequentially presented letters of nonsense syllables were used as stimuli and the names of common objects used as responses. Subjects received sixteen days of training on each type of task with auditory and visual tasks presented on alternate days.

Results

(1) Subjects with low auditory profiles learned more with the visual presentation, but made large gains by both methods. Recall did not vary with method.

(2) Subjects with low visual profiles also learned slightly more by the visual presentation. Recall was better by the visual method for three of

the five subjects. Individual differences among subjects were not as great as with the low auditory subjects.

(3) In a separate investigation, using four subjects and a smaller number of paired associates, the three high auditory subjects learned more by the auditory method and the one low auditory subject learned more visually.

Comments

No conclusions can be drawn from this study because of: (1) the small sample; (2) the possibility that the complex learning task used was not a sequential task; (3) the questionable validity of the criteria used to define low auditory and low visual profiles; and (4) the extreme lack of comparability of the two groups on IQ and MA.

The author of this study faced difficult problems in finding subjects whose ITPA profiles were suited to answering the important questions which were posed concerning learning and sense modalities. This area is one which is very important for future research. Perhaps one of the major contributions of this study will be the highlighting of pitfalls to be avoided in further investigation.

WEAVER, S. J. Psycholinguistic abilities of culturally deprived children. In *Early Training Project*, Murfreesboro, Tenn.: Tennessee City Schools and George Peabody College for Teachers, Nov. 1963.

Purpose

The purposes of this study were to (1) explore the psycholinguistic patterns of culturally deprived children and (2) evaluate the efficacy of a preschool training project in increasing language development of culturally deprived children.

Subjects

Three groups of young culturally deprived Negro children who are involved in a longitudinal study of the effects of preschool training on intellectual functioning and personal adjustment were studied. At the time the ITPA was administered, the T_1 ($N = 22$) and T_2 ($N = 21$) groups had been exposed to two 10-week summer training sessions plus home visitor contacts during the intervening winter. The control children in T_3 ($N = 18$) had had no special experience other than testing. During this 15-month period prior to ITPA testing the Binet mean IQ of the T_1 group changed from 85.7 to 95.7; the T_2 group from 88.2 to 96.3; and the T_3 control group from 88.2 to 83.4.

Procedure

The ITPA was individually administered to all children. Raw scores

were converted to T-scores and F and t tests used to compare subtest and total performances of the three groups.

Results

The experimental groups T_1 and T_2 were significantly higher than the control T_3 group on Visual Decoding, Auditory-Vocal Association and total ITPA score. The T_2 experimental group was significantly higher than the other experimental group and the control group on Visual-Motor Sequencing. In all three groups the auditory-vocal subtest scores were lower ($p < .001$) than the visual-motor subtests. Language ages were significantly lower ($p < .001$) than mental ages for all three groups. The correlation between language age and mental age for the total group was .83. For the girls, LA and MA correlated .88, while for the boys the correlation was .81.

Comments

Several findings are noteworthy in this study:

(1) The profiles of the two experimental groups were generally higher than the control group, but retained basically the same shape.

(2) The Visual-Motor Sequencing subtest continues its erratic behavior, noted in other investigations, and defies analysis at this stage.

(3) All three groups show the expected weakness in Auditory-Vocal Automatic (grammar). This points up the necessity for careful clinical interpretation of this subtest when the subject comes from a background other than white, middle-class.

(4) The strength shown by all three groups in Auditory-Vocal Sequencing has been observed by this reviewer infrequently and only in Negro groups. This subtest needs further investigation, perhaps more imperatively than any other.

This excellent and much-needed study is marred slightly by two factors: (1) the author's statement that "raw scores were converted to T-scores" is puzzling. If the scores obtained by the children studied here were used in this conversion it would seem that the mean for the groups should be 50, which is not the case. If the T-score conversion were actually based on the ITPA standard score norms, then the statement is misleading and obscures the fact that these children were actually being compared to the standardization group whose mean IQ was significantly higher than that of these subjects. (2) The author's idiosyncratic use of the term "channels" is inconsistent with all previous theoretical and applied work with the ITPA.

Annotated Bibliography of Additional ITPA Studies

BATEMAN, BARBARA and WETHERELL, JANIS. Psycholinguistic aspects of mental retardation. *Mental Retardation,* 3, April, 1965, pp. 8-13.

Generalizations concerning ITPA profiles of retarded children are derived from unpublished data based on various studies. Profiles are presented for a group public school low IQ children, a group of EMH boys in an institution, three IQ levels, mongoloids and equally retarded non-mongoloids, rural and urban low IQ children, two "typical" retarded boys, and two "Strauss-Syndrome" children. Implications for educational procedures are discussed briefly.

CHANG, T. C. A study of language abilities. *Hawaii Schools,* 2, No. 2, Oct. 1964, pp. 4-5. (Hawaii State Dept. of Education, Honolulu.)

The ITPA was administered to 30 Honolulu urban children and 30 Oahu rural children all of whom were considered by their teachers to be well adjusted. Their IQs were in the normal range with a group mean difference of three points. Group mean standard scores for the urban children ranged from + .4 to +1.5 on all subtests except Visual-Motor Sequencing (− 1.00). The rural children means ranged from − .6 to + .5 on all subtests except Auditory-Vocal Sequencing (+ 1.50). The high auditory memory performance of the rural children is hypothesized to be related to the importance of singing, music, and dance in their lives.

KENNEY, ELEANORE T. The small classroom — a developmental idiosyncratic approach to learning and behavioral disorders in children of normal intelligence. *Selected Convention Papers,* 42nd Annual CEC Convention. Washington, D.C.: Council for Exceptional Children, NEA, 1964, pp. 208-216.

Diagnostic and classroom procedures are described in some detail. The role of the ITPA in a diagnostic battery, its relation to other tests and to remedial, classroom activities are presented.

McCarthy, J. J. The use and usefulness of the ITPA. *Selected Convention Papers,* 42nd Annual CEC Convention. Washington, D.C.: Council for Exceptional Children, NEA, 1964, pp. 195-201.

This article presents brief historical background on the ITPA, reviews highlights of some ITPA research findings, outlines the validity studies undertaken by McCarthy and Olson (1964), and points up probable future directions of work with the test.

Mueller, M. W. Peabody College Research on the Illinois Test of Psycholinguistic Abilities. *Selected Convention Papers,* 41st Annual CEC Convention. Washington, D.C.: Council for Exceptional Children, NEA, 1963, pp. 183-187.

Four studies (Smith, 1962; Mueller and Smith, 1964; Mueller and Weaver, 1963; and Semmel and Mueller, 1962) on the ITPA are reviewed. Ease of learning ITPA administration and certain problems in the administration and test materials are discussed. Data on test-retest reliability (.82-.94) are presented and projected research plans involving the ITPA at Peabody College are mentioned briefly.

Mueller, M. W. Language profiles of mentally retarded children. *Selected Convention Papers,* 42nd Annual CEC Convention. Washington, D.C.: Council for Exceptional Children, NEA, 1964, pp. 149-153.

This study presents ITPA profiles of groups of retarded subjects of various IQ levels compiled from several other investigations. The outstanding feature of the data was the striking similarity of the group profiles at all levels of retardation. Visual-motor subtest performance tended to be higher than auditory-vocal subtest performance. A deficit, most pronounced in the lower IQ ranges, was noted in the encoding and automatic-sequential level tests.

Wiseman, D. E. Program planning for retarded children with psycholinguistic abilities. *Selected Convention Papers,* 42nd Annual CEC Convention. Washington, D.C.: Council for Exceptional Children, NEA, 1964, pp. 241-252.

A program of remediation based on the theoretical framework of the ITPA is discussed with special emphasis on principles of learning as applied in remedial work. A proposed experimental evaluation of individualized remediation based on ITPA diagnosis of disabilities is presented.

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